Section 2

2. ETMS Network Description

ETMS is the primary application used by the FAA for TFM. It is responsible for performing several traffic management functions including: traffic display, congestion prediction and management, ground delay programs, reroute programs, and collaborative decision making. Performing these tasks allows the FAA to minimize air traffic delays and congestion, and maximize the throughput of the NAS. The network that supports ETMS is the FAA's IP network, FIRMNet. The FIRMNet connects 85 "ETMS-enabled" sites using both leased circuits as well as Bandwidth Manager (BWM) switches. This section describes the architecture and system components that comprise FIRMNet. It details the various FAA locations connected to this network and explores both the physical and logical connections between these facilities.

2.1 Logical Connectivity

According to data received from the Air Traffic Control System Command Center (ATCSCC) regarding the configuration of FIRMNet, 85 ETMS-enabled sites connected to FIRMNet. These sites are Volpe National Transportation Systems Center (VNTSC), the ATCSCC, the William J. Hughes Technical Center (WJHTC), the FAA Academy, 21 Air Route Traffic Control Centers (ARTCC), 37 Terminal Radar Approach Control Facilities (TRACON), 7 ATCTs, 3 Combined Center Radar Approach Controls (CERAP), 8 regional offices, and 5 military or other facilities. Each of these sites is logically connected in the manner illustrated in the following figure, in which VNTSC serves as the hub for the network.

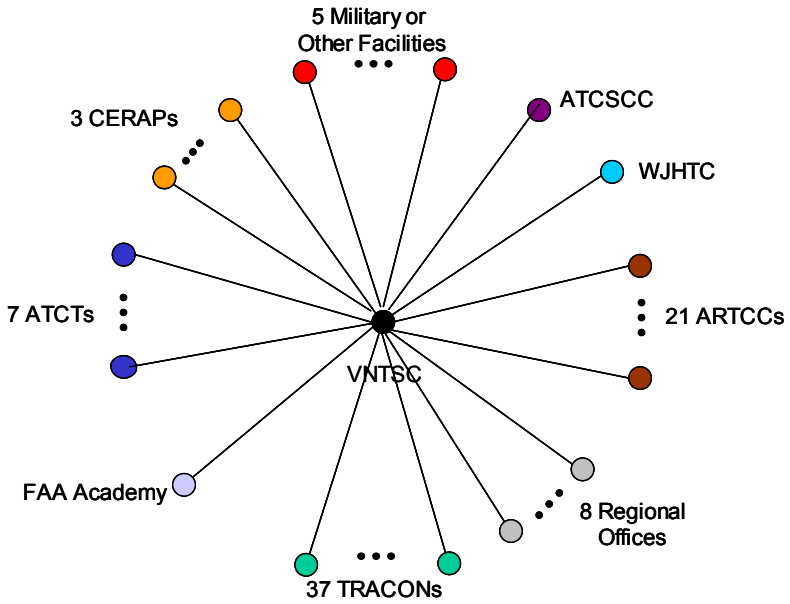

Figure 2-1: FIRMNet Logical Connectivity

As shown in Figure 2-1, all the sites have a direct logical connection to VNTSC. Although each of the sites has a FIRMNet router, no direct logical connectivity exists between any Traffic Management Unit (TMU) pair.

According to the ETMS Functional Description, ETMS traffic originating from TMUs and other external sources is first sent to VNTSC, where it is collected and collaborated, and then forwarded to all other ETMS-enabled sites.

2.2 Physical Connectivity

ETMS traffic and traffic resulting from other FAA applications travel over FIRMNet between various FAA locations. FIRMNet is composed of Internet Protocol (IP) routers and interconnected leased circuits. These physical circuits are in turn connected to BWM switches. The BWM switches create virtual circuits that allow the IP routers to move traffic through the network. Thus, the physical circuits and the virtual circuits are both connected by BWM switches. The BWM network is not exclusive to the FAA and is a shared IP network. Figure 2-2 is a representation of FIRMNet.

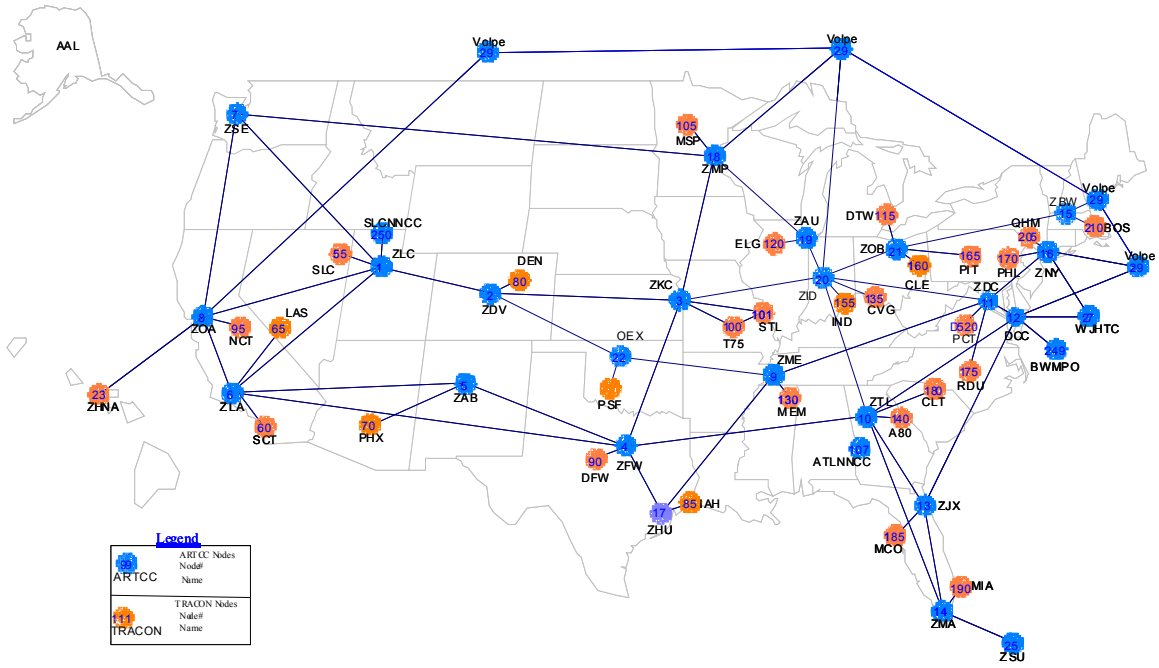

Figure 2-2: FAA's FIRMNet

Figure 2-2 shows the locations of ETMS-enabled TMUs. As shown in the figure, in addition to VNTSC, the WJHTC, the ATCSCC, and the FAA Academy, there are also 21 ARTCCs, 30 TRACONs, and 2 CERAPs connected by FIRMNet. However, Figure 2-2 does not show the other ETMS-enabled locations; 7 TRACONs, 7 ATCTs, 1 CERAP, the 8 regional offices, and 5 military facilities are excluded from the figure.

For this analysis, only those ETMS data flows that traverse FIRMNet are considered. Data flows within an ETMS site and external data flows that do not traverse FIRMNet are excluded from this analysis. Additionally, this analysis considers the data flows generating from all 85 sites that create load on the system.